Amendments to Claims:

This listing of claims will replace all prior revisions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A model predictive control system comprising:

a plurality of sensors indicating a current state of the system;

a desired trajectory generator for creating a desired dynamic response based upon commands;

a model of plant dynamics;

starting with the current state of the system, a nonlinear programming module receiving the desired dynamic response and at least one system life goal and formulating a problem of achieving the desired dynamic response and the at least one system life goal for a window spanning one or more time steps as a solution to a nonlinear program problem using methods of model predictive control; ~~and~~

a nonlinear programming solver solving the nonlinear programming problem in each time step using an iterative algorithm based upon the model predictive control problem and a nonlinear programming algorithm, the solver generating a plurality of actuator commands for achieving the desired dynamic response based upon the solution to the nonlinear programming problem; and

a plurality of actuators receiving the plurality of actuator commands from the nonlinear programming solver and acting upon the system to implement the desired dynamic response in accordance with the at least one system life goal.

2. (Original) The model predictive control system of claim 1 wherein the at least one system life goal includes at least one limit.

3. (Currently Amended) ~~The model predictive control system of claim 2~~ A model predictive control system comprising:

a plurality of sensors indicating a current state of the system;

a desired trajectory generator for creating a desired dynamic response based upon commands;

a model of plant dynamics;

starting with the current state of the system, a nonlinear programming module receiving the desired dynamic response and at least one system life goal in a performance index and formulating a problem of achieving the desired dynamic response and the at least one system life goal for a window spanning one or more time steps as a solution to a nonlinear program problem using methods of model predictive control, the at least one system life goal including at least one limit equation, wherein the plant dynamic model and limit equation are linear and the performance index is quadratic so as to form a quadratic programming problem; and

a nonlinear programming solver solving the nonlinear programming problem in each time step using an iterative algorithm based upon the model predictive control problem and a

nonlinear programming algorithm, ~~and~~ wherein the nonlinear programming solver is a quadratic programming solver.

4. (Original) The model predictive control system of claim 3 wherein the at least one system life goal changes based upon a change in a status signal.

5. (Original) The model predictive control system of claim 4 wherein the status signal is generated by a sensor.

6. (Original) The model predictive control system of claim 4 wherein the status signal indicates the status of an actuator.

7. (Currently Amended) A method for controlling a multivariable system including the steps of:

a) receiving a plurality of sensor signals indicating current conditions of the system;

b) receiving a plurality of commands;

c) receiving at least one system life goal;

d) determining a desired dynamic response of the system based upon the commands; ~~and~~

e) implementing a balance between the desired dynamic response and the at least one system life goal in a model predictive controller to generate a plurality of actuator commands; and

f) sending the plurality of actuator commands to a plurality of actuators acting upon the system in real time.

8. (Original) The method of claim 7 wherein said step e) is performed by weighting in a performance index for the model predictive controller.

9. (Original) The method of claim 8 further including the step of changing the balance between the desired dynamic response and the at least one system life goal.

10. (Original) The method of claim 9 further including the step of changing the weighting in the performance index to change the balance.

11. (Original) The method of claim 10 further including the step of changing the weighting based upon an indication of a failure of a component in the system.

12. (Original) The method of claim 11 further including the step of changing the limit based upon an indication of a time-to-maintenance of the system.

13. (Original) The method of claim 10 wherein said step e) further includes the step of setting a limit in a set of inequality equations for the model predictive controller.

14. (Original) The method of claim 13 further including the step of changing the limit based upon an indication of a time-to-maintenance.

15. (Original) The method of claim 13 further including the step of changing the limit based upon an indication of a failure of a component in the system or the declaration of an emergency.

16. (Original) The method of claim 7 wherein said step e) further includes the step of setting a limit in a set of inequality equations for the model predictive controller.

17. (Currently Amended) ~~The method of claim 16 further including the step of~~ A method for controlling a multivariable system including the steps of:

a) receiving a plurality of sensor signals indicating current conditions of the system;

b) receiving a plurality of commands;

c) receiving at least one system life goal;

d) determining a desired dynamic response of the system based upon the commands; and

e) implementing a balance between the desired dynamic response and the at least one system life goal in a model predictive controller to generate a plurality of actuator commands, including the steps of setting a limit in a set of inequality equations for the model predictive controller and changing the limit based upon an indication of a time-to-maintenance.

18. (Original) The method of claim 16 further including the step of changing the limit based upon an indication of a failure of a component in the system or the declaration of an emergency.

19. (Original) A computer readable medium storing a computer program, which when executed by a computer performs the steps of:

a) receiving a plurality of sensor signals indicating current conditions of the system;

b) receiving a plurality of commands;

c) receiving at least one system life goal;

d) determining a desired dynamic response of the system based upon the commands; and

e) implementing a balance between the desired dynamic response and the at least one system life goal in a model predictive controller to generate a plurality of actuator commands.

20. (New) The computer readable medium of claim 19 wherein the computer program, when executed by a computer further performs the step of:

f) repeating step a) to sense the current conditions as affected by the plurality of actuator commands.

21. (New) The computer readable medium of claim 19 wherein the computer program, when executed by a computer further performs the step of performing said steps a-f) iteratively in real time.